Work Order ID 77766

77766

December-21-11 9:28:46 AM

Item ID: D350-748-101 **Accept** *N900040100* **Setup Start** *NS1*

Revision ID: ~~U/R~~ **Stop** *NS2*

Item Name: Crosstube Installation, High Fwd

Start Date: 21/12/2011 **Start Qty:** 1.00 *1*

Required Date: 13/01/2012 **Req'd Qty:** 1.00 *1*

Reference:

Cust Item ID:

Customer:

Run Start *NR1*

Stop *NR2*

Approvals: **Process Plan:** M.L.J **Date:** 11/12/21 **Tooling:** **Date:**

QC: **Date:** **SPC (Y/N):** **Date:**

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
Draw Nbr	**Revision Nbr**								
D350-748-141	F ~~U/R~~ OK GP 12.04.19								
100	DOCUMENT CONTROL	0.00							
100									
DC	**Memo**	0.00							
Document Control	Photocopy bluefile & type labels per PPPD350-748-101				CHG002				
110	BENDING MACHINE - CROSSTUBES	0.00							
110									
CNC Bend 1	**Memo**	0.00							
CNC Delta 100 Bender	Bend tube as per Dwg D350-748-141 using CNC bender program D350F and Folio FT_____								
120	QC15- Crosstube Dimensional Check	0.00							
120									
QC	**Memo**	0.00							
Quality Control									

12-4-3

12.04.11 (1)

PTO

Dart Aerospace Ltd

W/O: 77766	WORK ORDER CHANGES						
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: D350-748-101 **PAR #:** _____ **Fault Category:** X-tube **NCR:** Yes (No) **DQA:** [illegible] **Date:** 12/05/30

Resolution: Rework **Disposition:** Rework **QA: N/C Closed:** [illegible] **Date:** 12/5/31

NCR: R 11455	WORK ORDER NON-CONFORMANCE (NCR)							
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			
12.04.11	110	Tube bent high.	12.04.11 CP CP1042	-Trim to 23.40" high - Acceptable	MO 12-4-18	JW 12-4-18	12.04.11 CP CP1042	12/05/29
12/04/17	II 110	Cuffs Found out to be out RADS from 0.060" to 0.100" R.C. Heat treat method	12.04.17 CP CP1042	Rework as per attached email original - min 2.198" max 2.278" after rework - min 2.240" 2.244"	12.04.18	Ron	12.04.17 CP CP1042	12/04/17
12.04.19	110	Tube crushing after bending is over tolerance	12.04.19 CP CP1042	Acceptable per attached SR	N/A	12/05/29	12.04.19 CP CP1042	12/05/29

NOTE: Date & initial all entries

Work Order ID 77766

77766

December-21-11 9:28:46 AM

Item ID: D350-748-101 **Accept** *N900040100* **Setup Start** *NS1*
Revision ID: U/R **Stop** *NS2*
Item Name: Crosstube Installation, High Fwd
Start Date: 21/12/2011 **Start Qty:** 1.00 *1* **Cust Item ID:**
Required Date: 13/01/2012 **Req'd Qty:** 1.00 *1* **Customer:**
Reference:

Run Start *NR1*
Stop *NR2*

Approvals: **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____
QC: _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
125		0.00							
125 HandEXtube Punch Hand Finishing Crosstubes	**Memo** ***Stress relief*** Heat treat crosstube as per QSI010 4.3 Temp:_____ Start time:_____ Finish time:_____	0.00				CL 12/04/11 (1)			
127	QC6- Inspect dimensions to drawing	0.00							
127 QC Quality Control	**Memo**	0.00				CP 12.14.11 (1)			

Issue P10 to metcan
P10; 16638
per DEO D350-748-141 F.1

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Item ID: D350-748-101 **Accept** *N900040100* **Setup Start** *NS1*
Revision ID: U/R **Stop** *NS2*
Item Name: Crosstube Installation, High Fwd
Start Date: 21/12/2011 **Start Qty:** 1.00 *1* **Cust Item ID:**
Required Date: 13/01/2012 **Req'd Qty:** 1.00 *1* **Customer:**
Reference:

Approvals: **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____ **Run Start** *NR1*
QC: _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____ **Stop** *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
130		0.00							
130	Crosstubes								
Crosstubes	**Memo**	0.00							
Crosstubes	1-Drill Tube as per Dwg D350-748-141 Using DT8876 A,B &C Drill Jigs, Set-up drill table as per QSI 010								
	2-Deburr								
	3-Engrave Part # and Batch # as per Dwg D350-748-141								
	4-Remove all marks from tube within limits of D350-748-141								
	5- Apply a light coat of LPS3 on the interior of tube								
	Batch: N/A								
140	QC5- Inspect part completeness to step on W/O	0.00							
140									
QC	**Memo**	0.00							
Quality Control	CHECK 10 DEG HOLES WITH DT8876E (EUROCOPTER CLAMP)								

JW 12-04-23
MO 12-4-23
8/16/25

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Item ID: D350-748-101 **Accept** *N900040100* **Setup Start** *NS1*
Revision ID: U/R **Stop** *NS2*
Item Name: Crosstube Installation, High Fwd
Start Date: 21/12/2011 **Start Qty:** 1.00 *1*
Required Date: 13/01/2012 **Req'd Qty:** 1.00 *1*
Reference: **Cust Item ID:** **Customer:**

Approvals: **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____
QC: _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____

Run Start *NR1* **Stop** *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
150	Outsource process-Cadplate per QSl017 4.1.9.1	0.00							
150									
Outsource3	**Memo**	0.00							
Outsource process - Cad plate	Issue P/O: 16826 Stress relief at 375° for 5 hours Magnetic Particle Inspect per ASTM E1444 Cadium Plate per AMS-QQ-P-416B, Class 1, Type 2 Embrittle relief at 375° for 8 hours, Chromate Treat Possibe Supplier: Southwest United Industries Ensure Certificate of Conformity is attached								
160	Receive & Inspect for Damage & Mat'l Certs	0.00							
160									
Packaging	**Memo**	0.00							
Packaging	Ensure certificate of conformity is attached								
170	QC5- Inspect part completeness to step on W/O	0.00							
170									
QC	**Memo**	0.00							
Quality Control									

CL 12/04/25 (1)

12/2/22

12/05/22

12/05/22 (1)

★ SEE WO CHG ATTACHED.

WM 12.05.22

POSITIVE RECALL
EFFECTIVE 12.04.22 AUTH
RELEASED 12.05.22 DATE
LOAD TEST

preach. issue P/O to acmen P/O: 17031 CL 12/05/22

w'd w'd + inspect attached cyc to w/o 12/6/22 (1)

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W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Dart Aerospace Ltd

W/O: 77766

WORK ORDER CHANGES

DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
11.10.05	161	LOAD TUBE TO 3500 lb FOR 1 MINUTE. REF D.S. EMAIL.		GP 12.05.15 QS1642		GP 12.05.15 QS1642	
11.10.05	162	NDT TUBE.					

Part No: D350-748-101 PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:

WORK ORDER NON-CONFORMANCE (NCR)

DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Chris Provencal

From: David Shepherd <dshepherd@dartaero.com>
Sent: Tuesday, April 27, 2010 3:40 PM
To: 'Mike Petsche'
Cc: 'Bill Beckett'; 'L Lacelle'; 'Chris Provencal'; 'Dan Stow'; ssheldon@dartaero.com
Subject: 350 crosstubes

Mike,

I discussed the 350 crosstube load testing with Bill a little while ago and this plan makes sense to him.

So, my recommendation to clear these crosstubes is to load the fwd crosstubes to 3500 lb and the aft crosstubes to 3000 lb in the deflection test rig and document on the work orders that this test has been completed. Hold max load for 1 minute. Per TP-D350-748-2, these loads represent the maximum load on these crosstubes at gross weight and are below the yield point of the material. I would like to request that Chris Provencal witness these tests and sign off the work orders based on his experience with Dart landing gears. My feeling is that if there is a problem with the parts, it will manifest itself during this load test. I, for one, would feel a lot more confident in testing each crosstube in this manner than relying totally on what Exova has to say. I think it would be very difficult to reach a conclusion on the whole batch on the basis of cracks in two parts from the batch.

I believe that we can accomplish this before next Friday, which also gives us time to hear what Exova has to say in case it has an impact on our decision. So far, what I have seen from Exova shows me that there are fluctuations in the heat treating but the tubes are heat treated to our specification.

For this reason, I believe we should tell DHS that it looks like we will be able to start shipping 350 crosstubes by May 7th pending a successful Engineering test of the material.

David.

Work Order ID 77766

December-21-11 9:28:46 AM

77766

Item ID: D350-748-101 **Accept** *N900040100* **Setup Start** *NS1*
Revision ID: U/R **Stop** *NS2*
Item Name: Crosstube Installation, High Fwd

Start Date: 21/12/2011 **Start Qty:** 1.00 *1*
Required Date: 13/01/2012 **Req'd Qty:** 1.00 *1*
Reference:

Cust Item ID:
Customer:

Run Start *NR1*
Stop *NR2*

Approvals: **Process Plan:** **Date:** **Tooling:** **Date:**
QC: **Date:** **SPC (Y/N):** **Date:**

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
180		0.00							
180	SprayPaint					AS	12-5-20		
SprayPaint	**Memo**	0.00							
Spray Painting	1-Prime inside crosstube as per QSI 005 4.2 B120133 start: 6:30 Finish: 7:15 2-Prime Outside of Tube as per Dart QSI 005 4.2 B121625 start: 11:15 Finish 12:00								
190	QC14- Inspect Spray Paint	0.00				1		12:05:22	
190									
QC	**Memo**	0.00							
Quality Control	Then, Wrap in plastic bag to protect from scratches								
200		0.00							
200	Crosstubes					0		12:05:22	
Crosstubes	**Memo**	0.00							
Crosstubes	1-Install Ground wire Insert, then insert screw and washer 2-Install Abraision strips as per Dwg D350-748-141 & QSI 035. 3-Install supports Using Dt8876 as per Dwg D350-748-141, Torque to 60-80 IN-LBS								

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W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Item ID: D350-748-101 **Accept** *N900040100* **Setup Start** *NS1*
Revision ID: U/R **Stop** *NS2*
Item Name: Crosstube Installation, High Fwd

Start Date: 21/12/2011 **Start Qty:** 1.00 *1*
Required Date: 13/01/2012 **Req'd Qty:** 1.00 *1*
Reference:

Cust Item ID:
Customer:

Approvals: **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____
QC: _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____

Run Start *NR1*
Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
210	QC5- Inspect part completeness to step on W/O	0.00							
210		8-21-23							
QC	**Memo**	0.00							
Quality Control									
220	Pick Kit	0.00							
220						1			12/05/23 JB
Packaging	**Memo**	0.00							
Packaging									
230	QC4- 100% Inspect kits for completeness	0.00							
230						1			12 05 23
QC	**Memo**	0.00							
Quality Control									

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W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Item ID: D350-748-101 **Accept** *N9000040100* **Setup Start** *NS1*
Revision ID: U/R **Stop** *NS2*
Item Name: Crosstube Installation, High Fwd

Start Date: 21/12/2011 **Start Qty:** 1.00 *1*
Required Date: 13/01/2012 **Req'd Qty:** 1.00 *1*
Reference:

Cust Item ID:
Customer:

Approvals: **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____
QC: _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____

Run Start *NR1*
Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
240		0.00							
240	Packaging								
Packaging	**Memo**	0.00							
Packaging	Identify and pack for shipping as per PPP D350-748-101 Location:_____ PPP Rev:_____								
250	QC21- Final Inspection - Work Order Release	0.00							
250									
QC	**Memo**	0.00							
Quality Control									

12/5/11 0:30

12/5/11

MF 12-05-23

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Picklist Print

December-21-11 9:28:50 AM

Work Order ID: 77766 *77766*

Parent Item: D350-748-101 *D350-748-101*

Parent Item Name: Crosstube Installation, High Fwd

Start Date: 21/12/2011 **Required Date:** 13/01/2012

Start Qty: 1.00 **Required Qty:** 1.00

Comments:
IPP Rev:A New Issue 06-07-05 JLM
IPP Rev:B Update qty of MS21042L5 06-09-12 KJ
IPP Rev:C Rev B 07-11-15 DD
IPP Rev D Combined manufacturing 08.04.02 EC verified by: DD
IPP Rev:E 08-06-24 revD as per dwg DD verified by:EC IPP Rev:F
10.08.04 added QSI010 4.3 DD verf:EC

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D350-748-141TRN		Manufactured	No		74713	110	Each	0.0000	1 **				
D350-748-141TRN Crosstube Turning Detail													
ALS4-1032-225		Purchased	No			200	Each	1,348.000	1 **	1			
ALS4-1032-225 Insert													
AN960JD10	NAS1149D0363J	Purchased	No			200	Each	0.0000	1 **	1			
AN960JD10 Washer													
D2856-400		Manufactured	No			200	f	200.2721	1.181 **	1.243158			
D2856-400 Abraison Strip													

Location	Loc Qty	Loc Code
ST281	1348	
108696	199	
110768	62	
118386	858	
118966	229	

Location	Loc Qty	Loc Code
ST409	200.2721	
63735	0.6696	
68076	0.3149	
71164	21.66	
73491	177.6276	

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Picklist Print

December-21-11 9:28:50 AM

Work Order ID: 77766 *77766*

Parent Item: D350-748-101 *D350-748-101*

Parent Item Name: Crosstube Installation, High Fwd

Start Date: 21/12/2011 **Required Date:** 13/01/2012

Start Qty: 1.00 **Required Qty:** 1.00

D3502-1	Manufactured	No		200	Each	23.0000	2	2	12·05·22
D3502-1							**		
Support									

B# 74873

Location	Loc Qty	Loc Code
ST063	23	
72129	3	
73419	20	

MS21920-20	Purchased	No		200	Each	60.0000	2	2	12·05·22
MS21920-20							**		
Clamp (per MIL-DTL-8783C)									

B# 121067

Location	Loc Qty	Loc Code
LG050	60	
116799	10	
119386	50	

MS27039-1-10	Purchased	No		200	Each	41.0000	1	1	12·05·22
MS27039-1-10							**		
Screw									

B# 120120

Location	Loc Qty	Loc Code
ST291	41	
119307	3	
119531	38	

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Picklist Print

December-21-11 9:28:50 AM

Work Order ID: 77766 *77766*

Parent Item: D350-748-101 *D350-748-101*

Parent Item Name: Crosstube Installation, High Fwd

Start Date: 21/12/2011 **Required Date:** 13/01/2012

Start Qty: 1.00 **Required Qty:** 1.00

AN4-41A		Purchased	No		220	Each	285.0000	8	8 ✓
AN4-41A								**	JB
Bolt									

Location	Loc Qty	Loc Code
ST360	285	
115108	3	
115705	7	
117619	50	
117795	25	
118451	50	118451
118838	50	
119328	100	

AN4-6A		Purchased	No		220	Each	4,130.000	16	16 ✓
AN4-6A								**	121631 JB
Bolt									

Location	Loc Qty	Loc Code
ST356	4130	
119017	4130	

AN5-32A		Purchased	No		220	Each	231.0000	4	4 ✓
AN5-32A								**	120910 JB
Bolt									

Location	Loc Qty	Loc Code
ST339	231	
118422	6	
118628	50	
118983	25	
119328	100	
119862	50	

AN960JD416	NAS1149D0463J	Purchased	No		220	Each	0.0000	32	32 ✓
AN960JD416								**	121255 JB 12/05/23
Washer									

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Picklist Print

December-21-11 9:28:50 AM

Work Order ID: 77766 *77766*

Parent Item: D350-748-101 *D350-748-101*

Parent Item Name: Crosstube Installation, High Fwd

Start Date: 21/12/2011 **Required Date:** 13/01/2012

Start Qty: 1.00 **Required Qty:** 1.00

AN960JD516	NAS1149D0563J	Purchased	No		220	Each	0.0000	8	8 ✓	
AN960JD516								**	119546 JB	
Washer										
D3500-1		Manufactured	No		220	Each	4.0000	4	4 ✓	
D3500-1								**	76000 JB	
Saddle										

Location	Loc Qty	Loc Code
ST424	4	
70695	4	

D3501-1		Manufactured	No		220	Each	396.0000	16	16 ✓	
D3501-1								**	JB	
Bushing										

Location	Loc Qty	Loc Code
ST063	396	
67757	4	
70682	100	70682
73391	85	
74866	207	

MS21042L4		Purchased	No		220	Each	9,077.000	24	24 ✓	
MS21042L4								**	121011 JB	12/05/23
Nut										

Location	Loc Qty	Loc Code
ST300	9077	
117441	51	
117601	342	
118451	133	
119017	3551	
119075	5000	

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Picklist Print

December-21-11 9:28:50 AM

Work Order ID: 77766 *77766*

Parent Item: D350-748-101 *D350-748-101*

Parent Item Name: Crosstube Installation, High Fwd

Start Date: 21/12/2011 **Required Date:** 13/01/2012

Start Qty: 1.00 **Required Qty:** 1.00

MS21042L5	Purchased	No		220	Each	2,130.000	4	4 ✓

MS21042L5

Nut

**

JB 12/02/23

Location	Loc Qty	Loc Code	
ST300	2130		
116105	5		
116548	43		
117611	52		
118179	496		
118910	34		
119109	1500		119109

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

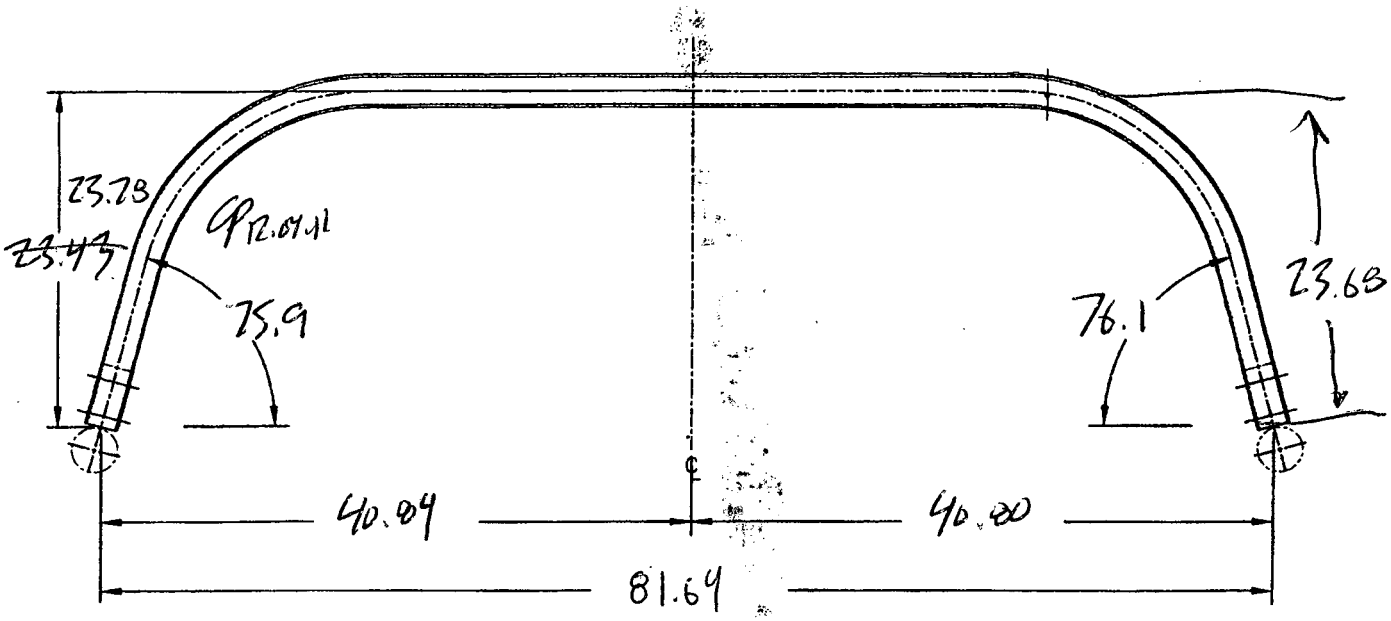
Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

DART AEROSPACE LTD	Work Order:	77766
Description: Crosstube High Fwd (AS350/355)	Part Number:	D350-748-101
Inspection Dwg: D350-748-141 **Rev:** F		Page 1 of 1

Required Dimension	Min	Max
Height	23.13	23.37
1/2 Span	40.78	41.02
Angle	75	77
Total Span	81.56	82.04



Comments
CRUSHING 6.1% / 5.4% Twist - 0.25°
PASSES >7

QC15 Inspection	
Date	12.04.11

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	
C	11.11.07	Dwg Rev updated	KJ	

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Item	Qty -141	Part Number	Description
1	X	D350-748-141	CROSSTUBE ASSEMBLY (AS 350/355 HI FWD)
2	1	D6015-125	CROSSTUBE (OR D6017-115)
3	2	D3502-1	SUPPORT
4	2	D2856-400-710	ABRASION STRIP
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
8	1	MS27039-1-10	SCREW

SHP
UNCOS
SUBJECT TO
WITH
WO
NO 77766 M.L.J
11/12/21

UNDER REVIEW
11.07.12

RELEASED
2011-01-18

GENERAL NOTES:

1) MATERIAL: MANUFACTURED FROM D6015-125 OR D6017-115
   FINISHED LENGTH = 110.270±0.06
2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2
   CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II
   PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
   PAINT OUTSIDE PER DART QSI 005 4.2
3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
4) UNITS: INCHES UNLESS OTHERWISE NOTED.
5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
6) IDENTIFICATION: DART PART NUMBER "D350-748-141" AND BATCH NUMBER ON INSIDE OF CUFF PER DART QSI 044 6.4 (VIBRATING STYLUS)
7) WEIGHT: 30.45 lbs
8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
9) BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALY, TRANSITION SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
10) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING. ACCEPTABLE TO VERIFY TENSILE STRENGTH BY HARDNESS TEST PER ASTM E18 TO 40-45 HRC.
12) INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE, CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
13) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.
14) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.
15) MAX TWIST AFTER BENDING: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.25 (ZN C1-3).

REV.	DESCRIPTION	BY	DATE
F	ADD HRC TEST OPTION (B8-1) PER PAR 09-040, ADD TWIST LIMIT (A8-1, C1-3), ADD D6015-125 OPTION (C8-1), STOCK DIM NOW MACHINED (D1-4)	CP	10.11.23
E	REVISE GENERAL NOTES; UPDATE TO CURRENT ADD STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A6-3); TOLERANCES (ZN C6-3, D1-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6017-115 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.03.31

DESIGN	DART AEROSPACE LTD	
DRAWN	HAWKESBURY, ONTARIO, CANADA	
CHECKED	DRAWING NO.	REV. F
MFG. APPR.	D350-748-141	SHEET 1 OF 4
APPROVED	TITLE	SCALE
DE APPR.	CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE 10.11.23		

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

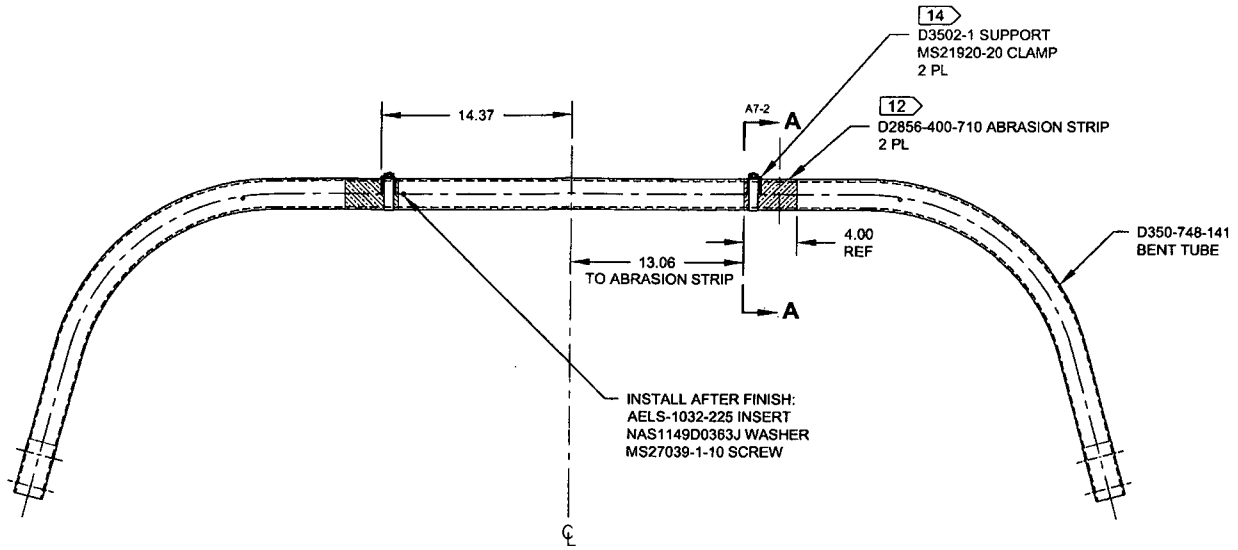
Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

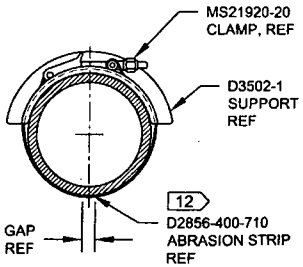
NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

77766



D350-748-141
ASSEMBLY DETAIL



SECTION A-A D4-2
SCALE 4X

UNDER REVIEW
11.07.11

RELEASED
2011 -01- 18

DESIGN		DART AEROSPACE LTD	
DRAWN		HAWKESBURY, ONTARIO, CANADA	
CHECKED		DRAWING NO.	REV. F
MFG. APPR.		D350-748-141	SHEET 2 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE 10.11.23			

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

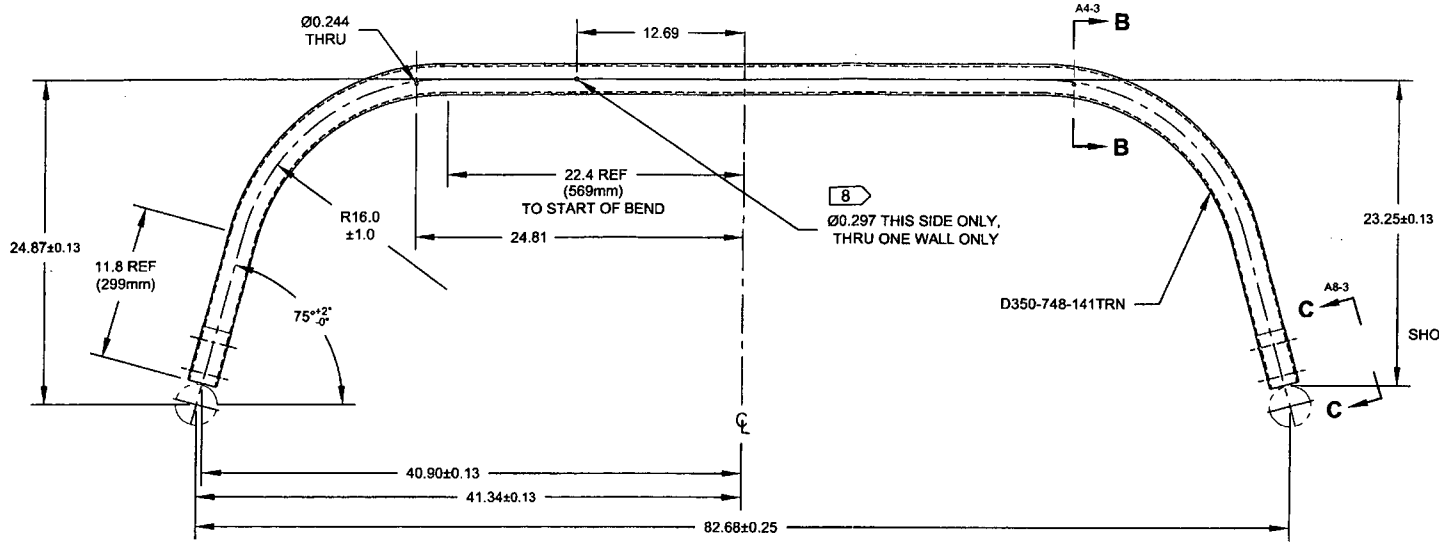
Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

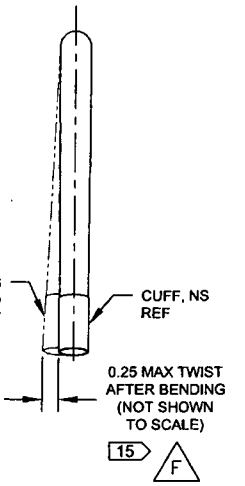
Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

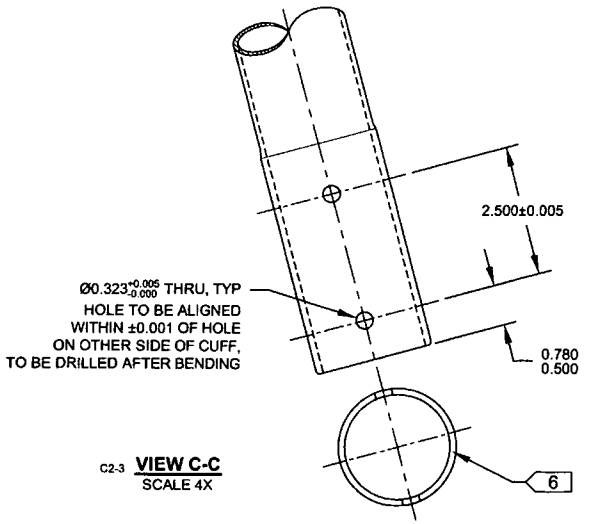
NOTE: Date & initial all entries

77766

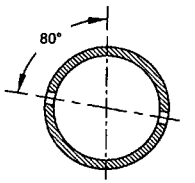




D350-748-141
BENDING AND DRILLING DETAIL 10



C2-3 **VIEW C-C**
SCALE 4X



SECTION B-B D3-3
SCALE 4X

UNDER REVIEW
11.07.12

RELEASED
2011-01-18

DESIGN		**DART AEROSPACE LTD** HAWKESBURY, ONTARIO, CANADA	
DRAWN		DRAWING NO.	REV. F
CHECKED		D350-748-141	SHEET 3 OF 4
MFG. APPR.		TITLE	SCALE
APPROVED		CROSSTUBE (AS 350/355 HI FWD)	NTS
DE APPR.			
DATE	10.11.23		

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

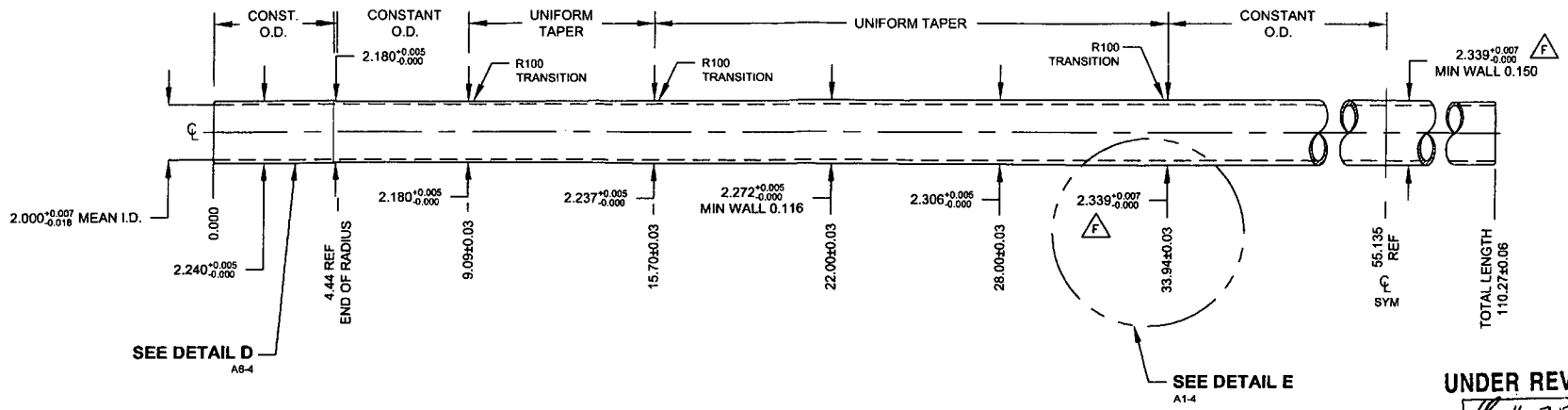
Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

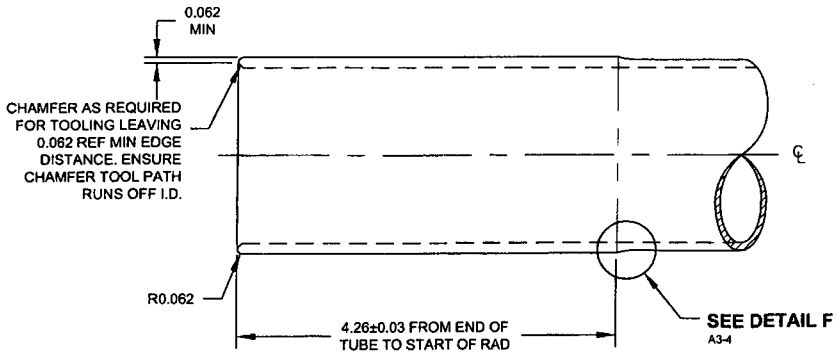
NOTE: Date & initial all entries

77766

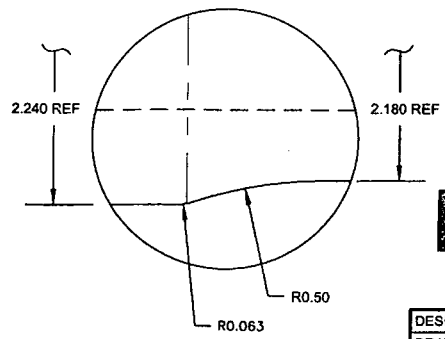


UNDER REVIEW
11.07.12

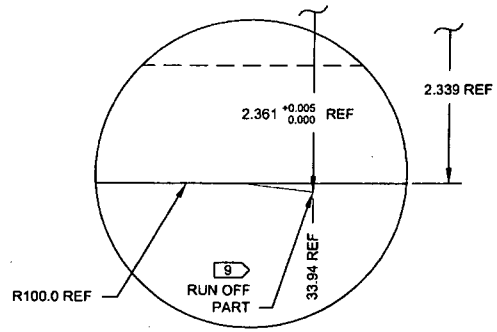
D350-748-141TRN TURNING DETAIL



DETAIL D: CROSSTUBE CUFF C7-4
SCALE 3X



DETAIL F: CUFF TRANSITION A5-4
NOT TO SCALE



RELEASED
2011-01-18

DETAIL E: TAPER RUN-OFF C3-4
NOT TO SCALE

DESIGN		**DART AEROSPACE LTD** HAWKESBURY, ONTARIO, CANADA
DRAWN		
CHECKED		DRAWING NO. D350-748-141 REV. F SHEET 4 OF 4
MFG. APPR.		
APPROVED		TITLE CROSSTUBE (AS 350/355 HI FWD) SCALE NTS
DE APPR.		
DATE 10.11.23		

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

DRAWING NO.	TITLE	REV. F	DART AEROSPACE LTD ENGINEERING ORDER	D.E.O. NO.	SHEET NO.	SCALE
D350-748-141	CROSSTUBE (AS 350/355 HI FWD)			D350-748-141-F-1	SHEET 1 OF 1	NTS

DRAWN	CHECKED	MFG. APPR.	APPROVED	DE APPR.
DATE 12.04.02	DATE 12.04.03	DATE 12.04.03	DATE 12.04.03	DATE 12.04.03

PURPOSE:
ADD A STRESS RELIEF OPERATION FOLLOWING BENDING

CHANGE:

ADD

10) AFTER BENDING: STRESS RELIEF AT 650°F ± 25°F FOR A MINIMUM OF 2 HRS.
AIR COOL TO AMBIENT TEMPERATURE
(REF. AMS2759/1E)

METCOR INC.

560 BOUL. ARTHUR-SAUVÉ
ST-EUSTACHE, QC, J7R 5A8
Tel: 450-473-1884 / Fax: 450-491-5498

Certificat de Conformité Détaillé
Detailed Certificate of Compliance

BON DE TRAVAIL order	CHARGEMENT load
175005	1

CLIENT / customer 215
DART AEROSPACE
1270 ABERDEEN
HAWKESBURY ON K6A 1K7

LIVRÉ À / shipped to: 1
DART AEROSPACE
1270 ABERDEEN
HAWKESBURY ON K6A 1K7

COMMANDE DU CLIENT customer po	BON DE LIVRAISON DU CLIENT customer shipper no.	MATÉRIEL material	CODE DE TRAITEMENT mat'l heat code	NUMÉRO DE LOT lot number
PO16638		Steel		

SPÉCIFICATIONS DU PROCÉDÉ
processing specifications

STRESS REL

SAE AMS 2759/1 REV.E

EXIGENCE / requirement	SPÉCIFICATIONS / specified	TESTS EXÉCUTÉS / performed	RÉSULTATS DE TESTS / results
Visual			

QUANTITÉ quantity	POIDS weight	DESCRIPTION DES PIÈCES parts description
9	270	D350-748-101 (7) CROSS TUBE (2) D350-748-201 CROSS TUBE CONTENANT: 1 NIL

Operation	Temp. spécifiée Specified Temp	Temps de trempe Spécifié Specified Soak Temp	Atmosphere	Carbone Carbon Potential	Q-Media Q-Temp	Four # Furnace #	Date Départ Start Date	Heure d'entrée Time In	Heure de sortie Time Out	Date Complétée Date complete
1,00 CONT. INIT.	LAVAGE		si nécessaire							
2,00 PREPARINC	COMPTAGE									
3,00 STRESS RE	650 +/-25°F	2 hrs	air			701				
4,00 FINAL INSP							04-05-2012			04-05-2012

COMMENTAIRES / comments

ALL THE HEAT TREATMENT PROCESSING PERFORMED ON THIS ORDER WAS ACCOMPLISHED USING HEAT TREATMENT EQUIPEMENT THAT MEETS THE REQUIREMENTS OF AMS 2759. ALL THE HEAT TREATMENT OPERATIONS WERE ACCOMPLISHED IN ACCORDANCE WITH THE REQUESTED/REQUIRED HEAT TREATMENT SPECIFICATION AND ALL REQUIRED VERIFICATIONS TEST HAVE BEEN PERFORMED AND DOCUMENTED. NO UNAUTHORIZED CHANGES OR DEVIATIONS TO REQUIRED HEAT TREATMENT SPECIFICATIONS OR PROCEDURES HAVE BEEN PERFORMED.

METCOR INC.
560 BOUL. ARTHUR-SAUVÉ
ST-EUSTACHE, QC, J7R 5A8
Tel: 450-473-1884 / Fax: 450-491-5498

Certificat de Conformité Détaillé
Detailed Certificate of Compliance

BON DE TRAVAIL order	CHARGEMENT load
175005	1

CLIENT / customer 215
DART AEROSPACE
1270 ABERDEEN
HAWKESBURY ON K6A 1K7

LIVRÉ À / shipped to: 1
DART AEROSPACE
1270 ABERDEEN
HAWKESBURY ON K6A 1K7

APPROUVÉ par / Approved by: Steve Lalonde MET 16 DATE: 2012-04-05

/ Nous certifions que toute l'information comprise sur ce rapport est exacte et conforme aux requis du client./We certify that all the information on this report is exact and in accordance with the order requirements.

Metcor Inc.

Metcor Inc.
560, boul. Arthur-Sauvé
St-Eustache (Québec) J7R 5A8
Tél.: 450 472-1884
Télécopieur/Fax administration : 450 491-5498
Télécopieur/Fax production : 450 491-6454

Certificat de conformité
Certificate

BON DE TRAVAIL order	CHARGEMENT load
175005	1

CLIENT / customer 216
DART AEROSPACE
1270 ABERDEEN
HAWKESBURY ON K6A 1K7

LIVRÉ À / shipped to:
DART AEROSPACE
1270 ABERDEEN
HAWKESBURY ON K6A 1K7

COMMANDE DU CLIENT customer po	BON DE LIVRAISON DU CLIENT customer shipper no.	MATÉRIEL material	CODE DE TRAITEMENT matl heat code	NUMÉRO DE LOT lot number
		Steel		

SPÉCIFICATIONS DU PROCÉDÉ
processing specifications

STRESS REL

BARE AMS STEEL REVIE

ENGRENAGE / equipment	SPÉCIFICATIONS / specified	TESTS EXÉCUTÉS / performed	RÉSULTATS DE TESTS / results
Visual			

QUANTITÉ unit qty	POIDS weight	DESCRIPTION DES PIÈCES parts description
8	270	D880-748-141-F-1

COMMENTAIRES / comments

INSPECTEUR / inspector: [signature] METCOR 7

DATE: 2012-04-05

Dora Cameron

From: Dan Stow <dstow@dartaero.com>
Sent: April 18, 2012 4:42 PM
To: Dora Cameron
Subject: FW: 350 crosstubes oval cuffs

DART AEROSPACE

Dan Stow
Special Projects Manager
T. 613-632-5200 | C. 613-676-3320 | F. 613-632-1426
1270 Aberdeen Street, Hawkesbury, Ontario, Canada, K6A 2K7

From: David Shepherd [mailto:dshepherd@dartaero.com]
Sent: Wednesday, April 18, 2012 12:10 PM
To: 'Bill Beckett'
Cc: 'Dan Stow'; 'L Lacelle'; 'Mike Petsche'; 'Eric Downing'; 'Pat Smith'
Subject: RE: 350 crosstubes oval cuffs

Agreed ... This seems OK to me ... Hopefully we only need to do this to a handful of crosstubes.

David

From: Bill Beckett [mailto:bbeckett@dartaero.com]
Sent: April-18-12 6:31 AM
To: 'David Shepherd'
Cc: 'Dan Stow'; 'L Lacelle'; 'Mike Petsche'; 'Eric Downing'; Pat Smith
Subject: RE: 350 crosstubes oval cuffs

David,
This looks like a relatively controllable process that we could have Dan carry out on the other crosstubes that are oval in the cuff area.
If you agree with this rework method, we will proceed with the remainder of the crosstubes. I suggest we do this via markup on the specific work orders.
Bill

From: Dan Stow [mailto:dstow@dartaero.com]
Sent: April 18, 2012 7:52 AM
To: Bill Beckett; David Shepherd; 'Mike Petsche'; L Lacelle; Eric Downing
Subject: 350 crosstubes oval cuffs

Hello All,

Please reference photo attached. The crosstube was placed in a hydraulic press between two sheets of plywood to prevent damage with the max. dimension facing up and down. 9000 lbs (5000psi at 1.5" bore) was applied and then crosstube was removed from the press and measured. Process was repeated with the crosstube at a different position because the max. dimension had changed location. Total time for rework was approximately 20 mins.

Cuff dimension before rework was min. 2.200" max. 2.280"

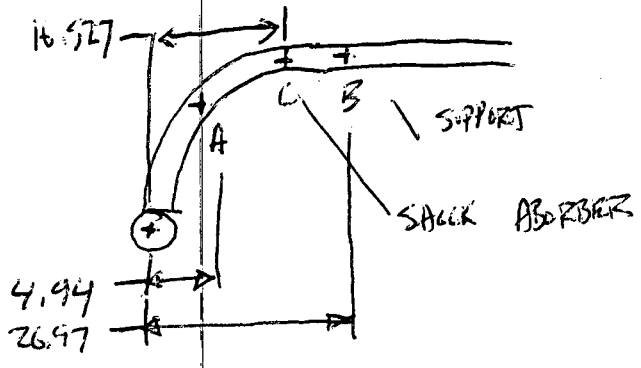
Cuff dimension after rework is min.2.230" max. 2.252" which is 0.010" below tolerance and 0.007" above tolerance but now fits in the drill jig.

DART AEROSPACE

Dan Stow
Special Projects Manager
T. 613-632-5200 | C. 613-676-3320 | F. 613-632-1426
1270 Aberdeen Street, Hawkesbury, Ontario, Canada, K6A 2K7

12.04.19

CRUSHING OF D350-748-101



POINT A $OD_1 = 2.400$ $OD_2 = 2.044$

CRUSHING = $(2.400 - 2.044)/(2.400 + 2.044)^2$ 8%

$I = 0.361\ in^4$ (AutoCAD)

POINT B $OD = 2.339$ $ID = 2.000$

~~CRUSHING~~ $I = 0.684\ in^4$

At A $F = Mc/I = P \times 4.94 \times 2.044/2 \times 0.361 = 13.98\,P$

At B $F = P \times 26.97 \times 2.339/2 \times 0.684 = 46.11 \times P$

M.S. $= 46.11/13.98 - 1 = 2.30$

∴ Tube will fail at support before tube fails at area of max crushing. ∴ 8% CRUSHING is Acceptable.

POINT C $I = 0.684\ in^4$

$F = Mc/I \Rightarrow$ ~~$P \times 16.527 \times 2.339/2 \times 0.684 = 28.26\,P$~~ $P \times 16.527 \times 2.339/2 \times 0.684 = 28.26 \times P$

$MS = 28.26/13.98 - 1 = 1.02$

∴ Tube will fail at shock absorber before area of max crushing ∴ 8% crushing is acceptable

12.04.19

CERTIFICATE OF CONFORMANCE

CADORATH PLATING CO. LTD.
2150 LOGAN AVENUE
WINNIPEG, MANITOBA R2J-0J1

DATE: May-08-2012

CONSIGNED TO: Dart Aerospace Ltd.
1270 Aberdeen St.
Hawksbury, ON K6A 1K7

W/O #: 114043

INVOICE #: 60317

CONTRACT OR
PURCHASE ORDER # PO16826

DESCRIPTION: SKID

QTY 1

P/N # d350-748-101

S/N # 77766

CADMIUM PLATE IAW AMS-QQ-P-416C TYPE 2 YELLOW CLASS 2.
MPI IAW ASTM-E-1444. BAKE HEAT CHART # 12-425 AND # 12-451.

CERTIFICATE: I certify that the items indicated here on have been inspected and tested and conform to all specifications and requirements detailed on the contract or purchase order.

CJ
22

Approved Inspector:

ACUREN

RAPPORT D'ESSAI NON DESTRUCTIF

(SUITE)

RAPPORT # P-11201

CLIENT Bart Aerospace DATE May 17, 2012 HEURE ☐ AM ☐ PM

ATTENTION NO. TRAVAIL ACUREN IBE-12-2012

RÉSULTATS (☐ METRIQUE ☐ IMPÉRIAL)

Crosstubes

①	work order	ID	83060	Item ID	D350-748-101				Inspection OK
	"	"	"	77766	"	"	"	"	"	OK
	"	"	"	76574	"	"	"	"	"	OK
	"	"	"	81518	"	"	"	"	"	OK
	"	"	"	76573	"	"	"	"	"	OK
	"	"	"	77763	"	"	"	"	"	OK
	"	"	"	73807	"	"	"	"	209	OK
	"	"	"	81523	"	"	"	"	201	OK

(2)(3)(4)(5)(6)(7)(8)(9)(10)(11)(12)(13)(14)(15)(16)(17)(18)(19)(20)(21)(22)(23)(24)(25)(26)(27)(28)(29)(30)(31)(32)(33)(34)(35)(36)(37)(38)(39)(40)(41)(42)(43)(44)(45)(46)(47)(48)(49)(50)(51)(52)(53)(54)(55)(56)(57)(58)(59)(60)(61)(62)(63)(64)(65)(66)(67)(68)(69)(70)(71)(72)(73)(74)(75)(76)(77)(78)(79)(80)(81)(82)(83)(84)(85)(86)(87)(88)(89)(90)(91)(92)(93)(94)(95)(96)(97)(98)(99)(100)

(3) # on crosstube B83060

No paper work Fit with this number Inspection OK

2 x-tubes under batch # 83060 → Preliminary Design

SIGNATURES

REPRÉSENTANT À LA CLIENTÈLE Ian Tilley MOULÉE — SIGNATURE

TECHNICIEN (SIGNATURE)

NAME (MOULÉE): Pierre-Luc Dubois — 1er TECHNICIEN

NIVEAU CGSB 2 NIVEAU SNT 2 NIVEAU CGSB

No. ENREG. CGSB 12205 No. ENREG. CGSB

2e TECHNICIEN NIVEAU SNT

FTJ #:

RAPPORT REVISÉ PAR: NOM INITIALES

H-3050

BLANCHE – COPIE DU CLIENT JAUNE – COPIE DU BUREAU ROSE – COPIE DU TECHNICIEN OR – COPIE DU BUREAU

RAPPORT D'INSPECTION PAR RESSUAGE

P - 11201

ACUREN

PAGE 1 DE 2

CLIENT: Cirit Aerospace — DATE: May 17th 2012
ATTENTION: Mme Chantel — N° TRAVAIL ACUREN: 18-12-2012
ADRESSE: 1270 Aberdeen St Hawkesbury, Ont — N° CLIENT PO/WO: 305551
SITE DE TRAVAIL: Hawkesbury — HEURE: AM ☐ PM ☒
ACCEPTATION STD.: ASTM E 709 & E 165 — DATE/RÉV.: 2005
PROJET: Inspection Fluorescent on Cantubes external surface
ITEM(S) EXAMINÉ: 9 Cantubes

DESCRIPTION DES TRAVAUX — N° PROCÉDURE LT-002 DATE/RÉV. 2009 — N° TECHNIQUE LT-002 DATE/RÉV. 2009

N° ITEMS: 9 Cantubes see below — MATÉRIEL: Steel / ~~Ti~~ — ÉPAISSEUR: —

DESCRIPTION: Fluorescent inspection, 100% on external surface on 9 Cantubes

DÉTAILS DES INSPECTIONS

MÉTHODE: ☒ FLUORESCENT ☐ VISIBLE

MARQUE: Magnaflux			
PÉNÉTRANT: Zyglo ZL-60	TEMPS PÉNÉTRATION MIN.	10	MIN.
DISSOLVANT PÉNÉTRANT: H20	TEMPS SÉCHAGE MIN.	>10	MIN.
RÉVÉLATEUR: ZKD-S-2	TEMPS PÉNÉTRATION MIN.	10	MIN.

TYPE RÉVÉLATEUR: ☐ CAN AQUEUX ☐ AQUEUX ☐ SEC

☒ LAVABLE À L'EAU ☐ MÉTHODE DISSOLVANT ☐ PRÉ-ÉMULSIONNANT

LUM. NOIRE S/N 16H60 ☐ PUISS. > 1000 µ W/CM² ☐ AMBIANT < 2 fc

ÉQUIP. LUMIÈRE ☐ LAMP.POCHE ☐ LAMP.CULASSE ☐ PUISS.>100 fc @ SURFACE

AUTRES — DATE CAL DUE

MÈTRE LUM. N/S

SURFACE INSPECTÉE

CONDITION SURFACE: ☐ MEULÉE ☐ SOUDÉE ☒ MACHINÉE ☐ GRENAILLÉE ☒ MÉTAL PROPRE

TEMPÉRATURE SURFACE: ☐ < - 4°C/ 20°F ☐ - 4°C/ 20°F DE 10°C/50°F ☒ 10°C/50°F DE 52°C/125°F ☐ > 52°C/125°F

RÉSULTATS- (☐ MÉTRIQUE ☐ IMPÉRIAL)

See other Sheet For Result

P/O 17031

SIGNATURES

REPRÉSENTANT: Jim Titley (MOULÉ) — SIGNATURE

TECHNICIEN (SIGNATURE): [signature]

NOM (MOULÉ): Pierre-Luc Lacroix

1ER TECHNICIEN		2IÈME TECHNICIEN	
ONGC NIVEAU	2	ONGC NIVEAU	
SNT NIVEAU	2	SNT NIVEAU	
ONGC N° REG.	132205	ONGC N° REG.	

FTJ #

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PT Décembre 200